Public policy to further youth training – evidence from the Danish apprenticeship system, 1931-2002

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Overview of presentation

Introduction

Intrinsic problems in apprenticeship systems

The Danish system compared to
   Austria, the Netherlands and Ireland

Overview of development, 1931-2002

Estimation

Discussion

Failures, market for training

(1) Capital market imperfections: credit market
          constraints & unisurable risks

(2) Labour market imperfections: external benefits
          for firms

(3) Problems of information:
          - inherent productivity of trainees
          - quality of training

The apprenticeship system, Denmark

A dual system

on-the-job training at employer

formal schooling in training schools (full time:

½ year + blocks on 10 weeks, most cases)

A contract:

employer promise employment (and training)

for 2-4 years (stable employment)

apprentice promise to stay at employer in contract

period

the system is "bound apprenticeship"

National recognised certification at end of contract period
(masterpiece, certified by employer and union repr.)

Major stakeholders in upholding the system:
employer organisations & labour unions

Violations of contracts:
Try to solve locally (committees of employer and
union representatives)
National level: special board can fine violators
Members of board: employer and union repr.
Arbitrator: Supreme Court judge

Are apprenticeship contracts enforceable?

At the end of contract the apprentice has:
- productivity close to a skilled worker
- a wage much less than a skilled worker
(about 60 percent, first year: 40 percent)

A necessity if the employer has to recover training costs

The *runaway problem*: The apprentice has incentive to runaway from his master and enjoy a higher wage at another employer

Countries with full scale apprenticeship system ?
Germany, Austria, Denmark, (Switzerland?)

First three countries: Collective bargaining

A certificate is necessary to be categorised as a skilled
worker in the collective agreements (incentive for
apprentice to fulfil his obligations)

Is collective bargaining and unionisation a necessary
condition for the survival of an apprenticeship
system?

Austria, vocational training

Size: 40 percent of a youth cohort

Duration: 2-4 years

Share of time in training companies: 80 percent

Certification: Master piece (employer and employee representatives in boards that examine)

Remuneration: collective agreement, employers/trade unions

Subsidies: marginal targeted one in 2005

Ireland, vocational training

Size: 10-15 percent of a youth cohort

Duration: 7 phases (4 on-the-job 3 off-the job)

Certification: Off-the job phases are monitored by a
government agency

Remuneration: collective agreement in most cases

Subsidies: national training fund, levy on employers on 0.7
percent of earnings of employees

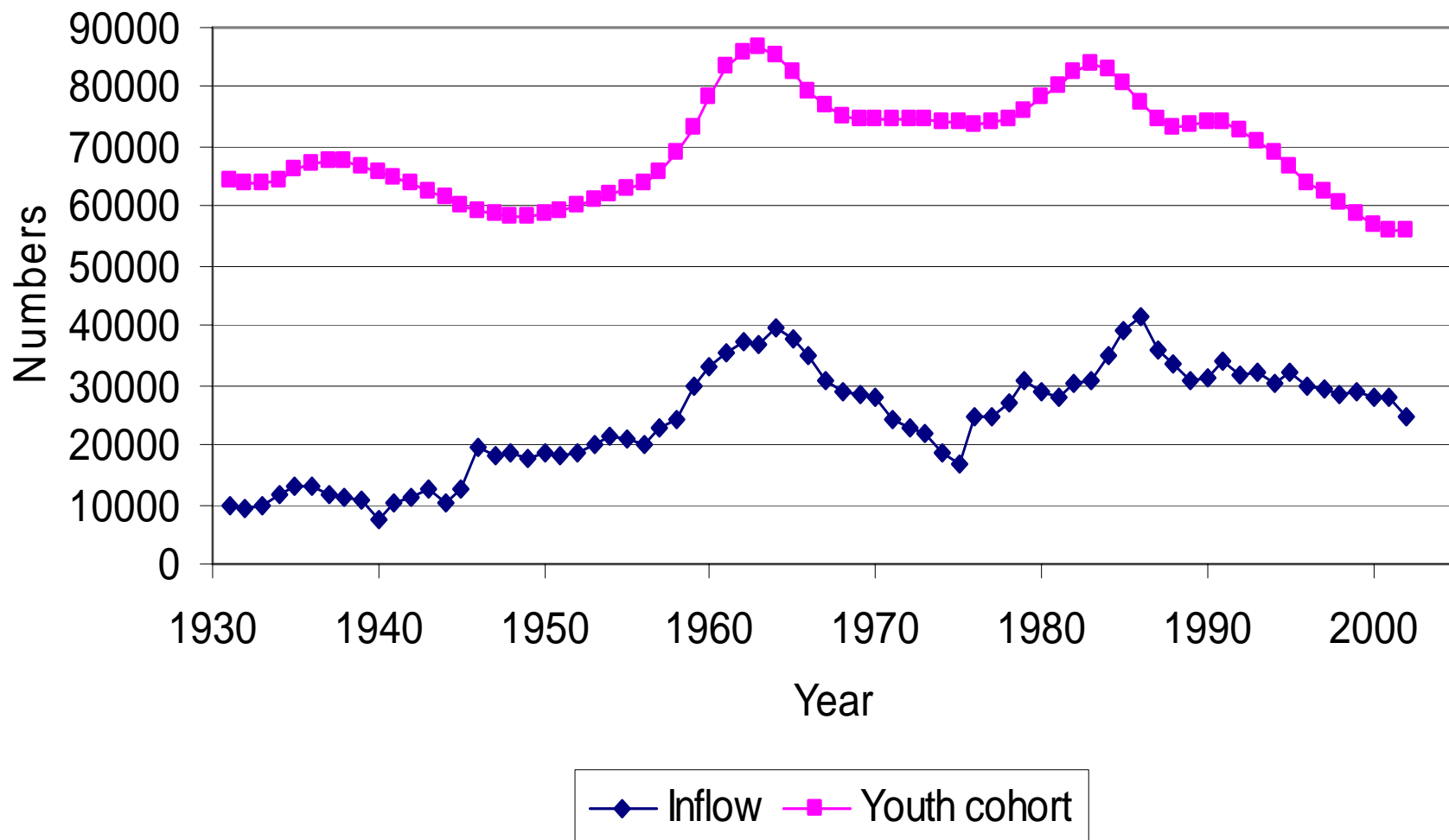# The Netherlands, vocational training

Size: about 27 percent of a youth cohort in the "practically
    oriented pathway",
    also school based pathway (the largest)

Duration: Not specified, Dutch system is "competence"
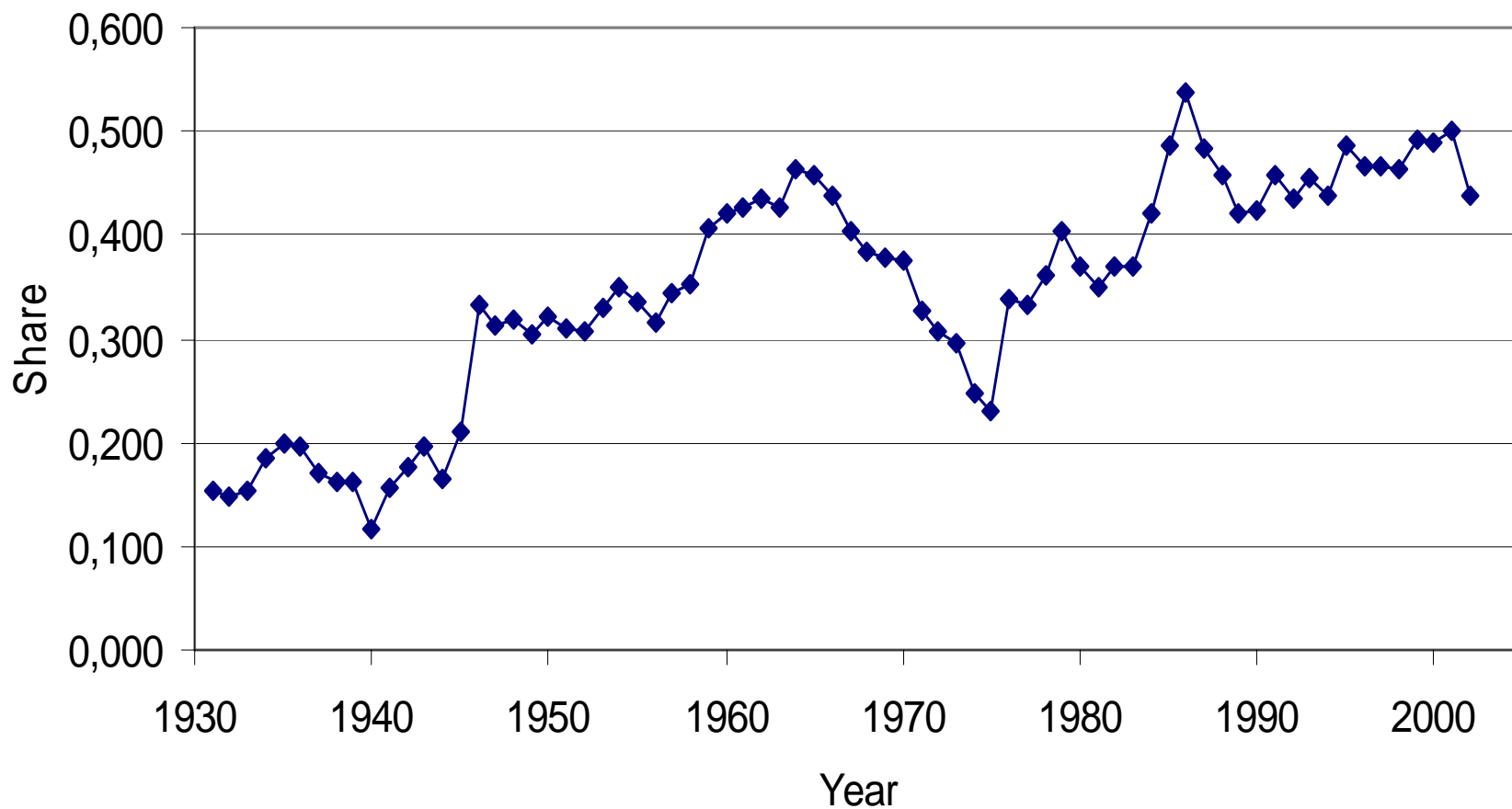   based

Certification: By educational institution

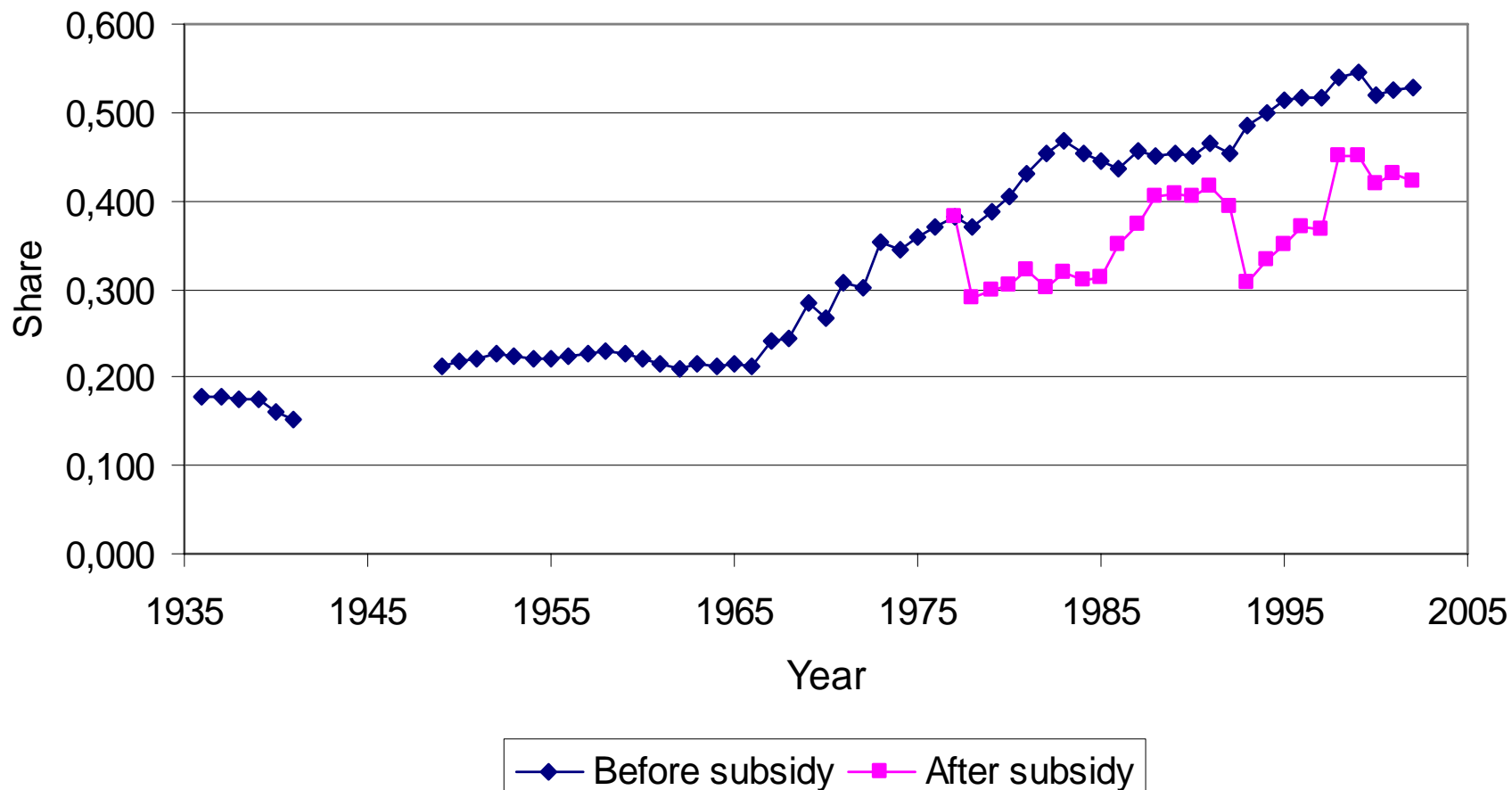Remuneration: Not common in all sectors

Figure 1. The inflow of apprentices and the youth cohort, 1931-2002

Figure 2. Inflow af apprentices as a proportion of the youth cohort, 1931-2002

Figure 3. Wages of apprentices as a proportion of wages for unskilled workers before and after employment subsidies, 1936-2002

Relative success:

Contingent on changes in occupational sectors?
Demand from new sectors?

Answer: No (almost)

Table, type of education

The inflow of apprentices distributed according to type of education, 1939-2000. Percent.

Year	1939	1950	1960	1970	1980	1990	2000
Type of education							
Commerce, clerical trades	34	34	39	41	42	44	40
Construction	22	22	19	25	20	15	20
Iron and metal	26	23	23	25	24	21	17
Graphic	3	3	3	2	2	2	2
Technical and other industry	4	5	1	0	0	0	1
Service	3	5	6	2	2	2	3
Food industry and home economics	7	7	6	4	9	12	10
Agriculture and fishing	0	2	1	1	1	2	2
Transportation, etc.	0	0	0	0	0	1	3
Health	0	0	0	0	0	0	1
Public security	0	0	0	0	0	0	0
Total	100	100	100	100	100	100	100
Numbers	10856	18856	30931	27092	28817	31284	27846

Empirical modelling:

two-factor CES production function

$$Q = \left[\delta \left(e^{\mu t} N \right)^{-\rho} + (1-\delta) \left(e^{\lambda t} A^s \right)^{-\rho} \right]^{-1/\rho}$$

Q : Output N : Other workers

A^s : Apprentices, stock

$\sigma = 1 / (1 + \rho)$: Substitution elasticity

Connection: Stock and flow

$$A^s = A \exp(\alpha + \beta t):$$

$A:$ Inflow of apprentices

$\exp(\alpha + \beta t):$ Average contract length

Result: Estimating equations

First order condition:

$$\ln A = \sigma \ln (1 - \delta) - \alpha + \ln Q$$

$$-\sigma \ln w_A^n + ((\sigma - 1)\lambda - \beta)t$$

w_A^n :   Wage rate of apprentices, net
                        (after subsidy)

U :   Youth cohort

First order condition:

$$\Delta \ln A = -2.702 - 0.291 \ln\left(w_A^n\right)_{-1} - 0.278\left(\ln A - \ln Q\right)_{-1} + 0.348 \ln U_{-1} + 0.005t$$

$$(1.284) \quad (0.115) \qquad\qquad (0.103) \qquad\qquad\qquad (0.140) \qquad\quad (0.003)$$

$$+0.487\Delta \ln w_A^n + 0.242\Delta \ln A_{-1} + 1.400\Delta \ln Q + 0.323 D76$$

$$(0.111) \qquad\qquad (0.095) \qquad\qquad (0.451) \qquad\quad (0.072)$$

$$R^2 = 0.661 \quad \hat{\sigma} = 0.060 \quad T = 1950 - 2002$$

$$F_{ar}(2,42) = 2.674 \quad F_{arch}(1,42) = 0.806 \quad \chi^2_{nd}(2) = 0.818$$

$$F_{he}(15,28) = 0.764 \quad F_{RESET}(1,43) = 5.375$$

Ratio condition:

$$\ln \frac{A}{N} = \sigma \ln \frac{1-\delta}{\delta} - \alpha - \sigma \ln \frac{w_A^n}{w_N}$$

$$+ \left((\sigma - 1)(\lambda - \mu) - \beta \right) t$$

$$U \; / \; P : \quad \text{Youth cohort/population}$$

Ratio condition:

$$\ln \frac{A}{N} = 1.367 - 0.334 \ln \frac{w_A^n}{w_N} + 0.727 \ln \left(\frac{A}{N} \right)_{-1} + 0.006t + 0.329 \ln \left(\frac{U}{P} \right)_{-1}$$

$$\quad (0.654) \quad (0.111) \qquad\quad (0.088) \qquad\qquad\qquad (0.002) \qquad (0.142)$$

$$+ 0.272 \Delta \ln \left(\frac{A}{N} \right)_{-1} + 0.328 D76$$

$$\qquad (0.105) \qquad\qquad\qquad (0.073)$$

$$\mathrm{R}^2 = 0.911 \quad \hat{\sigma} = 0.0640 \quad T = 1950 - 2002$$

$$\mathrm{F}_{ar}(2,44) = 2.210 \quad \mathrm{F}_{arch}(1,44) = 0.635 \quad \chi^2_{nd}(2) = 0.527$$

$$\mathrm{F}_{he}(11,34) = 0.560 \quad \mathrm{F}_{RESET}(1,45) = 2.396$$

Main outcome of estimation

Wage elasticity on about one

Implies demand elasticity for apprentice on about one

Respectable magnitude

Wage subsidies appear effective in furthering
        the education of apprentices

Discussion

Successful system, quantity, share of youth cohort:
From 15 percent, late 1930is
to 45 percent, late 1990is

Determinants of inflow, econometrically
Business cycle
Youth cohort
Costs of education (employment subsidy
plays central role)

Discussion, cont.

Prerequisites, successful development:

A. Contracts enforceable

      certification recognised nationally

      wage as a skilled worker demands certification
            (collective bargaining)

      legal system, violators of contracts fined

B. Adjustment, apprenticeship to new skill requirements:

      Major adjustments/reforms seldom
            (3 times during the last 50 years)

      Instead fine tuning of programs (by employer and
            employee representatives)